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## Original Research

# Measuring the relationships between adverse childhood experiences and educational and employment success in England and Wales: findings from a retrospective study



K. Hardcastle <sup>a,\*</sup>, M.A. Bellis <sup>a,b</sup>, K. Ford <sup>b</sup>, K. Hughes <sup>a,b</sup>, J. Garner <sup>a</sup>,  
G. Ramos Rodriguez <sup>a</sup>

<sup>a</sup> Policy, Research and International Development Directorate, Public Health Wales, Clwydian House, Wrexham, LL13 7YP, UK

<sup>b</sup> Hot House, College of Human Sciences, BIHMR, Bangor University, Wrexham, LL13 7YP, UK

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## ABSTRACT

**Objectives:** Educational and employment outcomes are critical elements in determining the life course of individuals, yet through health and other mechanisms, those who suffer adverse childhood experiences (ACEs) may experience barriers to achieve in these domains. This study examines the association between ACEs and poor educational outcomes, before considering the impact of ACEs and education on employment in adulthood.

**Study design:** Retrospective cross-sectional surveys were conducted in England and Wales using a random stratified sampling methodology.

**Methods:** During face-to-face household interviews ( $n = 2881$ ), data were collected on demographic factors, ACEs, self-rated childhood affluence, the highest qualification level attained and the current employment status.

**Results:** While respondents with  $\geq 4$  ACEs were significantly more likely to have no formal qualifications (adjusted odds ratio [AOR] = 2.18;  $P < 0.001$ ), among those who did achieve secondary level qualifications, the presence of ACEs did not further impact subsequent likelihood of going on to attain college or higher qualifications. However, results suggest a persisting independent impact of high ( $\geq 4$ ) ACEs, which were found to be significantly associated with both current unemployment (AOR = 2.52,  $P < 0.001$ ) and long-term sickness and disability (AOR = 3.94,  $P < 0.001$ ). Modelled levels of not being in employment ranged from as little as 3% among those with 0 or 1 ACE and higher qualifications to 62% among those with no qualifications and  $\geq 4$  ACEs (adjusted for age, gender and childhood affluence effects).

**Conclusions:** Compulsory education may play a pivotal role in mitigating the effects of adversity, supporting the case for approaches within schools that build resilience and tackle educational inequalities. However, adults with ACEs should not be overlooked

\* Corresponding author. Tel.: +01978 318417.

E-mail address: [katie.hardcastle@wales.nhs.uk](mailto:katie.hardcastle@wales.nhs.uk) (K. Hardcastle).

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and efforts should be considered to support them in achieving meaningful employment.

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## Introduction

Early life experiences, whether positive or negative, have a major impact on the brain of the developing child. While children may benefit from growing up in safe, stable and nurturing environments, experiencing trauma and chronic stress can have detrimental effects on neurological, hormonal and immunological development.<sup>1–3</sup> Stress can influence the way that a child processes information, makes decisions and interacts with others, contributing to less favourable outcomes throughout childhood and into adulthood. A considerable global evidence base now describes the life course impacts of adverse childhood experiences (ACEs; e.g. maltreatment and exposure to household stressors), including the adoption of health-harming behaviours such as smoking and heavy alcohol consumption, poor child and adult mental health and earlier onset of physical ill health.<sup>4–7</sup>

Although there is strong evidence connecting exposure to ACEs and the development of antisocial behaviours such as involvement in violence,<sup>8</sup> other familial, social and economic outcomes are less well examined.<sup>9</sup> A critical element in determining the life course of individuals is their ability to access and use educational opportunities, influencing their long-term socio-economic outcomes.<sup>10</sup> Neurological changes resulting from chronic childhood stress can adversely impact cognitive functions affecting learning, memory and attention and contribute to deficits in early intellectual development.<sup>11</sup> Furthermore, ACEs can also increase threat perception, impacting on a child's ability to identify and respond to different emotions and form healthy relationships with teachers, other adult educators or fellow pupils.<sup>12,13</sup> In one US study ( $n = 5000$ , 5- to 6-year-olds), exposure to three or more ACEs was associated with below-average academic and literacy skills and increased teacher-reported behaviour problems.<sup>14</sup> A recent global review found that all forms of childhood violence, including witnessing domestic violence, doubled the risk of school dropout.<sup>15</sup> When individuals with ACEs attend school, they are more likely to suffer school-based violence victimisation and perpetration<sup>16</sup> and have been shown to care less about school performance and the completion of tasks such as homework.<sup>17</sup> Exposure to ACEs is also associated with externalising and internalising behaviours and attention deficit hyperactivity disorder (ADHD) diagnosis in middle childhood,<sup>18</sup> all of which may impact a child's chances of thriving in a traditional learning environment.

Poor educational attainment is a risk factor for adolescent and adult problems including conduct disorders<sup>19</sup> and substance abuse.<sup>20</sup> The impact of ACEs on formal qualifications may leave individuals less likely to achieve meaningful employment along with the associated financial and

psychological benefits (e.g. self-esteem and social status<sup>21,22</sup>). However, adversity in childhood may also directly impact employment and work performance in adulthood through poorer health status and social skills development. At present, it is unclear to what extent the relationship between ACEs and employment may be mediated by educational attainment.<sup>23</sup> Here, we examine the relationship between childhood adversity and both education and employment outcomes in English and Welsh populations. We test the hypothesis that high levels of ACEs are associated with poor educational outcomes (qualifications), independently of demographic factors. We then examine the impact of ACEs on adult employment both through their relationships with educational attainment and independently of qualifications obtained.

## Methods

### Data collection

Data were generated from two retrospective cross-sectional surveys in England (Hertfordshire, Luton and Northamptonshire; June–September 2015)<sup>24</sup> and Wales (National; February–May 2015).<sup>25</sup> A random stratified sampling approach was used with Lower Super Output Area (LSOA; geographic areas with approximately 1500 residents) as the sampling unit. LSOA selection was stratified by region; deprivation (2011 Index of Multiple Deprivation/2014 Welsh Index of Multiple Deprivation rankings); ethnicity (England only) and urban/rural categorisation (England only).<sup>24,26</sup> In England, postcode address files were used to randomly select households within each sampled LSOA. In Wales, trained interviewers randomly selected households within each sampled LSOA until reaching an age and gender quota.<sup>25</sup> Multiple visits ( $\leq 5$ ) were made to selected households to recruit participants, and one individual per household was invited to participate (based on the next birthday). The original study inclusion criteria were as follows: being resident in a selected LSOA; aged 18–69 years and cognitively able to participate in a face-to-face interview. Trained interviewers provided potential participants with information as to the purpose of the study, its voluntary, confidential and anonymous nature and their right to withdraw at any time. Questionnaires were delivered by computer-assisted personal interviewing and computer-assisted self-interviewing for sensitive questions (e.g. ACE questions). In addition to English, and Welsh for those surveyed in Wales, respondents could opt to be interviewed in French, Spanish, Polish, Hindi, Punjabi, Urdu, Gujarati, Bengali, Marathi, Pashto, Sindhi, Saraiki and Balochi. Separate target sample sizes were set for each survey

to ensure adequate representation of residents within each geographic location (5528 England; 2000 Wales).

A total of 28,349 households were visited across both study locations, and contact was made with 16,222 residents (42.8% of households were unoccupied at the time of visit). Of occupied households, 20.4% ( $n = 3315$ ) were not eligible to take part, and 32.1% ( $n = 5200$ ) declined participation. Language could not be accommodated for a further 56 individuals. Overall, 7651 residents completed a questionnaire, resulting in an overall compliance rate of 59.3% (of eligible occupied households). However, analyses here required a subset of individuals from the original sample who were: (a) exposed to the English or Welsh education systems; (b) of typical working age; and (c) not currently engaged in further or higher education. Therefore, those not born in the UK ( $n = 1510$ ), older than 60 years ( $n = 1245$ ) or younger than the age at which they may be completing higher education or still transitioning into employment (18–29 years,  $n = 1406$ ) and those who were identified as students, carers or retirees ( $n = 316$ ) were excluded from analyses. Finally, any individual who did not complete all questions necessary for the analysis was removed ( $n = 293$ ), resulting in a final analytical sample of  $n = 2881$ .

### Measures

Eleven established ACE questions from the Centers for Disease Control and Prevention (CDC) short ACE tool<sup>27</sup> were used to measure childhood exposure (before the age of 18 years) to nine forms of abuse and family dysfunction (see [Supplementary Table 1](#)). Responses were used to calculate an individual's total ACE score, which was then categorized into ACE counts (0, 1, 2–3 and  $\geq 4$ ), as is consistent with methodologies applied elsewhere.<sup>4</sup> Participants indicated their highest level of education based on the National Qualifications Framework/Qualification and Credit Framework (no qualifications; secondary education or equivalent qualifications [level 2]; further/college qualifications [level 3]; higher qualifications [ $\geq$  level 4]; [Supplementary Table 1](#)). Current employment status was reported as the following: employed (including full-time employment, part-time employment and self-employment); unemployed (reasons not specified) or long-term sick and disabled (LTSD). As a measure of relative deprivation during childhood, respondents were asked to rate their childhood affluence on a scale of 1 (least affluent) to 10 (most affluent; [Supplementary Table 1](#)). Collected demographics included age (categories: 30–39; 40–49; and 50–59 years), sex (male and female) and ethnicity (self-defined based on the UK census categories). Owing to the small numbers in many ethnic groups, this variable was recategorised as a dichotomous variable (white; black and minority ethnic [BME]).

### Analysis

Statistical analyses were completed in SPSS, v23. Analyses used chi-squared test for initial bivariate examination of associations with education and employment outcomes and binomial and multinomial logistic regression to examine the independent contributions of ACEs and demographics to the

outcomes of interest. A generalized linear model function was used to generate adjusted means (i.e. estimated marginal means) for education and employment outcomes for individuals in different ACE categories.

## Results

The total lifetime prevalence of having at least one ACE was 45.4%, with just over one in ten respondents having suffered  $\geq 4$  ACEs during the first 18 years of life ([Table 1](#)). One in ten respondents (10.5%) reported having no formal qualifications, and 13.6% described themselves as unemployed or LTSD.

### Education

Increased ACE count was associated with increased prevalence of no qualifications and decreased prevalence of higher education qualifications in bivariate analyses ([Table 1](#)). However, the relationship between ACEs and college-level qualifications did not show a clear dose–response relationship. All measured demographic factors were significantly associated with the attained qualifications, with poorer educational outcomes (no qualifications) most prevalent in the eldest (50–59 years) age group, male respondents and those who identified as white ethnicity. The inverse was true for higher educational qualifications, which were most prevalent in the youngest age category (30–39 years), women and BME respondents. Self-rated childhood affluence was significantly positively associated with qualification level ([Table 1](#)).

Multivariate models were run to account for the confounding effects of demographic variables and childhood affluence in the relationship between ACEs and educational outcomes ([Tables 2 and 3](#)). A significant independent effect of ACE count remained, with respondents with  $\geq 4$  ACEs over twice as likely to have left formal education with no qualifications, compared with those with no ACEs ([Table 2](#)). Although experiencing 2–3 ACEs also significantly increased the likelihood of no qualifications (compared with those with no ACEs), the impact of any one ACE alone was not significant. Childhood affluence was independently associated with lower odds of obtaining no qualifications. Adjusted proportions of individuals with no qualifications in each ACE category are shown in [Fig. 1](#).

To examine progress beyond secondary qualifications, additional analyses were conducted that excluded those with no qualifications. For those who did achieve secondary qualifications, a history of ACEs was not found to significantly impact subsequent likelihood of going on to attain either college or higher qualifications ([Table 3](#)). Attainment of higher, but not college qualifications, was positively associated with childhood affluence, with a one-point increase in self-reported childhood affluence associated with a 19% increase in odds of attaining higher qualifications. Odds of achieving higher qualifications were significantly greater in BME respondents, and age remained significantly associated with qualification level across all multivariate models ([Tables 2 and 3](#)).

**Table 1 – Adverse childhood experiences and demographic relationships with education and employment outcomes.**

Variable	All (n = 2881)		By education/highest qualifications (%)				By employment status (%)		
	n	%	None (n = 304)	Secondary (n = 1029)	College (n = 669)	Higher (n = 879)	Employed (n = 2489)	Unemployed (n = 227)	LTSD (n = 165)
ACE count									
0	1572	54.6	8.5	35.9	23.9	31.7	89.4	6.2	4.4
1	536	18.6	10.3	32.1	24.4	33.2	89.4	6.5	4.1
2–3	475	16.5	12.4	36.6	21.7	29.3	85.7	8.4	5.9
≥4	298	10.3	18.8	39.6	20.1	21.5	66.1	18.5	15.4
X <sup>2</sup> , P			42.799, <0.001				122.463, <0.001		
Survey country									
Wales	795	27.6	10.1	41.0	23.0	25.9	81.8	10.3	7.9
England	2086	72.4	10.7	33.7	23.3	32.2	88.2	7.0	4.9
X <sup>2</sup> , P			16.479, 0.001				20.248, <0.001		
Age category (years)									
30–39	920	31.9	6.7	31.3	25.4	36.5	87.5	9.6	2.9
40–49	1047	36.3	9.4	36.1	25.1	29.4	88.9	5.5	5.5
50–59	914	31.7	15.8	39.7	18.8	25.7	82.4	8.9	8.8
X <sup>2</sup> , P			76.086, <0.001				41.516, <0.001		
Gender									
Male	1342	46.6	12.7	33.6	24.2	29.5	86.1	8.0	6.0
Female	1539	53.4	8.7	37.6	22.4	31.4	86.7	7.8	5.5
X <sup>2</sup> , P			15.691, 0.001				0.300, 0.861		
Ethnicity									
White	2705	93.9	10.8	36.5	23.4	29.3	86.1	7.9	6.0
BME	176	6.1	7.4	23.3	19.9	49.4	90.9	8.0	1.1
X <sup>2</sup> , P			32.772, <0.001				7.342, 0.025		
Childhood (mean) affluence score <sup>a</sup>		4.9	5.3	5.4	5.8	5.5	4.7	4.8	
F, P			28.846, <0.001				39.276, <0.001		

ACE, adverse childhood experiences; BME, black and minority ethnic; LTSD, long-term sick and disabled.

<sup>a</sup> Childhood affluence was measured on a self-assessed scale from 1 to 10.

**Table 2 – Logistic regression analysis of adverse childhood experiences, demographics and their association with having no educational qualifications.**

Variable	AOR	No qualifications		P
		Low CI	High CI	
ACE count				
0	(ref)			0.001
1	1.29	0.92	1.81	0.138
2–3	1.41	1.00	1.97	0.048
≥4	2.18	1.50	3.16	<0.001
Survey country <sup>a</sup>				
England	1.28	0.97	1.69	0.087
Age category (years)				
30–39	(ref)			<0.001
40–49	1.44	1.03	2.02	0.032
50–59	2.59	1.88	3.57	<0.001
Gender <sup>a</sup>				
Female	0.65	0.51	0.83	0.001
Ethnicity <sup>a</sup>				
White	1.23	0.68	2.24	0.493
Childhood affluence <sup>b</sup>	0.87	0.80	0.94	<0.001

ACE, adverse childhood experiences; BME, black and minority ethnic; AOR, adjusted odds ratio; CI, confidence interval (95%).

<sup>a</sup> Reference categories for bivariate variables are Wales; male and BME.

<sup>b</sup> Childhood affluence was measured on a self-assessed scale from 1 to 10 and was included in the model as a continuous variable. Only those terms significantly related to no qualifications (ACE count, age, gender and childhood affluence) were retained in the final logistic regression model.

## Employment

There was a strong positive relationship between childhood ACE count and not being in current employment, either through unemployment or LTSD (Table 1). While no significant relationship was found by gender, both (non-employment) outcomes were more common in respondents from Wales and associated with lower childhood affluence (Table 1). Increasing age was strongly related to higher prevalence of LTSD.

In a multinomial logistic regression model examining the independent effects of ACEs and qualifications on unemployment and LTSD, both outcomes remained significantly independently associated with higher levels of childhood adversity. Compared with those with no ACEs, respondents with ≥4 ACEs were two and a half times more likely to be currently unemployed and almost four times more likely to report being unable to or out of work because of sickness or disability, irrespective of qualifications achieved (Table 4). No significant independent effects on employment were found among those with one, two or three ACEs. Likelihood of unemployment and LTSD decreased significantly with increasing levels of qualifications. After other variables were taken into account, no relationship was found between childhood affluence and LTSD. However, experiencing greater affluence in childhood was related to lower odds of later unemployment, with a unit decrease in childhood affluence increasing the odds of unemployment by 15% (Table 4).

Adjusted risks of not being in employment (for any cause, i.e. unemployment or LTSD) were calculated using a logistic regression model (Fig. 2; Supplementary Table 2). Modelled

**Table 3 – Multinomial logistic regression analysis of adverse childhood experiences, demographics and their associations with further educational outcomes among those with secondary qualifications.**

Variable	Reference category <sup>a</sup>	College qualifications			P	Higher qualifications			P
		AOR	Low CI	High CI		AOR	Low CI	High CI	
ACE count									
0	0.414								
1		1.12	0.86	1.45	0.419	1.21	0.95	1.55	0.126
2–3		0.90	0.68	1.19	0.462	0.99	0.77	1.29	0.958
≥4		0.80	0.56	1.14	0.207	0.81	0.57	1.15	0.812
Survey country <sup>b</sup>									
Wales	0.053	0.85	0.68	1.06	0.140	0.78	0.63	0.96	0.019
Age category (years)									
30–39		1.66	1.29	2.15	<0.001	1.55	1.23	1.96	<0.001
40–49		1.46	1.15	1.86	0.002	1.17	0.93	1.47	0.171
50–59	<0.001								
Gender <sup>b</sup>									
Male	0.142	1.21	1.00	1.48	0.053	1.05	0.87	1.26	0.643
Ethnicity <sup>b</sup>									
BME	<0.001	1.13	0.70	1.80	0.618	2.19	1.48	3.25	<0.001
Childhood affluence <sup>c</sup>	<0.001	1.03	0.97	1.10	0.347	1.19	1.12	1.26	<0.001

AOR, adjusted odds ratio; CI, confidence interval (95%); ACE, adverse childhood experiences; BME, black and minority ethnic.

Analysis excludes those with no qualifications to analyse the progress among those who do achieve secondary qualifications.

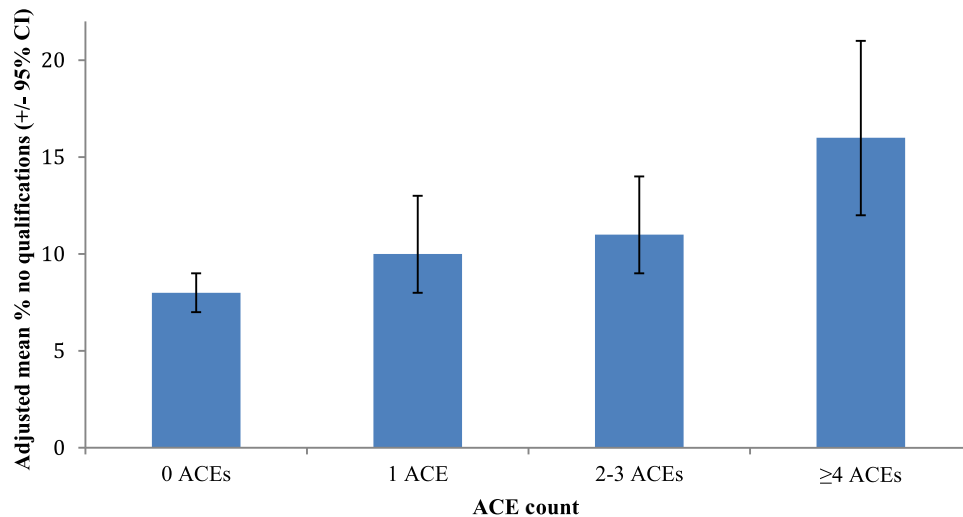
<sup>a</sup> Reference category for dependant variable was secondary level qualifications. P values in the reference category column refer to the overall contribution of that variable to the model.

<sup>b</sup> For binary variables, reference categories are England; female and white ethnicity.

<sup>c</sup> Childhood affluence was measured on a self-assessed scale from 1 to 10 and was included in the model as a continuous variable.

Only those terms significantly related to college and higher qualifications (survey country, age, ethnicity and childhood affluence) were retained in the final multinomial logistic regression model.





**Fig. 1 – Adjusted mean percentage of individuals with no qualification by ACE count. Adjusted means are calculated using estimated marginal means function (see [Methods](#)). CI, confidence interval; ACE, adverse childhood experiences.**

**Table 4 – Multinomial logistic regression analysis of adverse childhood experiences, demographics, level of education and their associations with current non-employment.**

Variable	Reference category <sup>a</sup>	Unemployed			P	LTSD			P
		AOR	Low CI	High CI		AOR	Low CI	High CI	
ACE count									
0	<0.001								
1		0.94	0.62	1.43	0.773	0.96	0.58	1.59	0.863
2–3		1.16	0.77	1.74	0.485	1.26	0.78	2.02	0.350
≥4		2.52	1.66	3.81	<0.001	3.94	2.49	6.23	<0.001
Qualifications (highest)									
None		13.95	8.04	24.20	<0.001	20.98	10.41	42.29	<0.001
Secondary		5.79	3.52	9.55	<0.001	6.53	3.33	12.79	<0.001
College		1.59	0.86	2.94	0.141	2.68	1.25	5.76	0.012
Higher	<0.001								
Survey country <sup>b</sup>									
Wales	0.010	1.37	1.01	1.86	0.044	1.59	1.12	2.25	0.012
Age category (years)									
30–39		1.42	1.01	2.01	0.047	0.41	0.26	0.67	<0.001
40–49		0.69	0.48	0.99	0.044	0.67	0.46	0.98	0.036
50–59	<0.001								
Gender <sup>b</sup>									
Male	0.848	0.93	0.69	1.24	0.606	1.03	0.74	1.44	0.863
Ethnicity <sup>b</sup>									
BME	0.128	1.45	0.78	2.68	0.813	0.37	0.89	1.56	0.177
Childhood affluence <sup>c</sup>	0.002	0.85	0.78	0.93	<0.001	0.94	0.85	1.04	0.251

LTSD, long-term sick and disabled; AOR, adjusted odds ratio; CI, confidence interval (95%); ACE, adverse childhood experiences.

<sup>a</sup> Reference category for dependant variable was currently employed. P values in the reference category column refer to the overall contribution of that variable to the model.

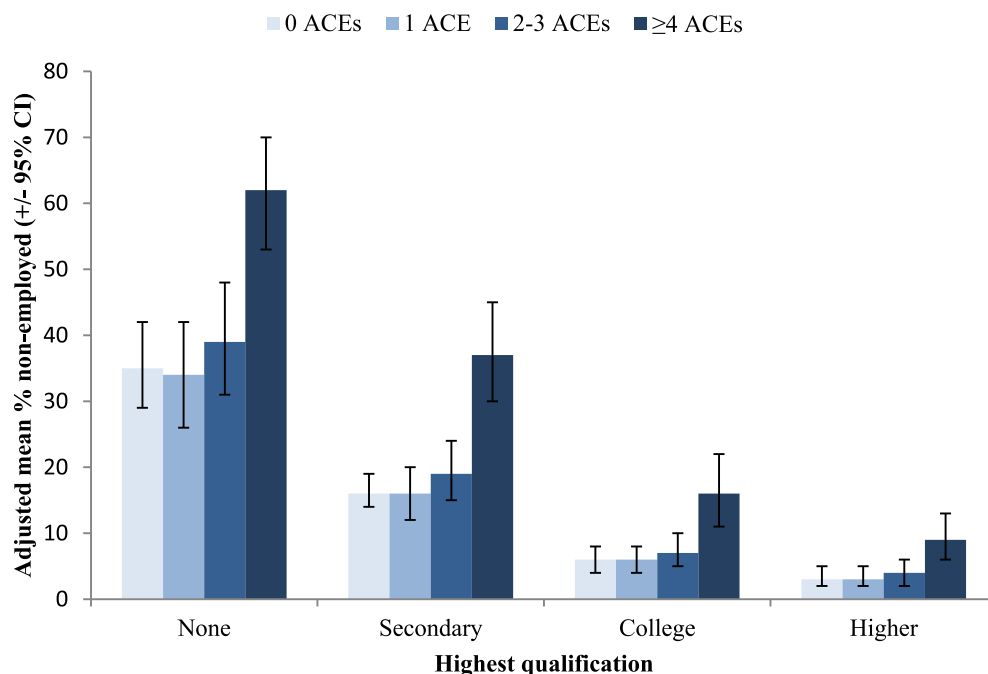
<sup>b</sup> For binary variables, reference categories were England; female and white ethnicity.

<sup>c</sup> Childhood affluence was measured on a self-assessed scale from 1 to 10 and was included in the model as a continuous variable. Only those terms significantly related to unemployment and LTSD (ACE count, qualifications, survey country, age and childhood affluence) were retained in the final multinomial logistic regression model.

levels of not being in employment ranged from as little as 3% among those with 0 or 1 ACE and higher qualifications to 62% among those with ≥4 ACEs and no qualifications (adjusted for age, gender and childhood affluence effects).

## Discussion

Findings from this UK study build on international evidence of a deleterious effect of childhood adversity beyond just



**Fig. 2 – Adjusted mean percentage of non-employed individuals by qualification level and ACE count. Adjusted means are calculated using estimated marginal means function (see [Methods](#)). Non-employed refers those who are currently unemployed or long-term sick and disabled. CI, confidence interval; ACE, adverse childhood experiences.**

physical and mental health, with results suggesting a dose–response relationship also exists between ACE count and poor educational outcomes. Equality in access to quality education is both a national and global priority.<sup>28,29</sup> Across the UK in 2017, around 7.7% of 18- to 64-year-olds had no recognisable qualifications,<sup>30</sup> consistent with the prevalence figures in this household sample. However, although attainment is improving, there is evidence of a persisting educational inequality gap, with a strong association between affluence and educational outcomes.<sup>31,32</sup> Our findings confirm the importance of childhood affluence but also identify an independent impact of ACEs on attaining any qualification. In fact, a history of childhood adversity ( $\geq 4$  ACEs) more than doubles the risk of having no qualifications. Education goals cannot be met when children live in fear. Chronic stress can negatively impact cognition, school connectedness and school attendance,<sup>33</sup> all of which may mediate the relationship between ACEs and (non)attainment. With around one in ten adults in the UK affected by a high number of ACEs and around one in 13 having no recognisable qualifications, preventing ACEs or mitigating their impacts could have a considerable impact on improving the levels of basic education across the population.

Nevertheless, the impact of ACEs is not deterministic. Here, only around one in five of those with  $\geq 4$  ACEs left education with no formal qualifications. This suggests that compulsory education may play a key role as a resilience factor enabling individuals with ACEs to progress, despite early adversity. Increasingly, attention is being devoted to developing trauma-informed (TI) services and systems in education. TI approaches include multicomponent interventions that support all students by changing organisation-wide practice (e.g. in

disciplinary policies and procedures) through workforce development to raise awareness of the nature and impact of trauma on young learners.<sup>34</sup> Evidence suggests positive impacts of TI models on student resilience,<sup>35</sup> coping skills,<sup>36</sup> attention,<sup>37</sup> attendance and behaviour.<sup>38</sup> Resilience studies also highlight the importance of having the consistent support of a trusted adult to mitigate the effects of ACEs.<sup>39</sup> While this may commonly be thought of as a parent or relative, the potential role of an educator should be considered. Positive teacher relationships have previously been found to protect against emotional and behavioural problems among victims of abuse and neglect.<sup>40</sup> Further resilience assets that may be supported in the education setting, such as being given opportunities to apply one's skills and being treated fairly, also have the potential to offset the impact of ACEs on factors such as childhood health and school attendance.<sup>41</sup> However, in the UK and elsewhere TI models and other resilience-developing interventions have not been implemented at scale, despite their potential benefits to those suffering ACEs.

Critically, among individuals who attained at least some qualification(s), when considering the attainment of subsequent qualifications, any independent effect of ACEs disappeared. Thus, those with even the highest category of ACEs attained college and higher qualifications at a rate that did not differ significantly from that of their ACE-free peers. However, in line with the existing studies that outline the impact of socio-economic factors on access to higher education,<sup>42,43</sup> strong and continued links were found between self-reported childhood affluence and achieving higher qualifications. Whether those individuals with ACEs who progressed to further or higher education had benefited from support in school or elsewhere could not be identified in this study.



However, that ACEs were not significantly linked with academic achievement in later education supports the critical role of earlier support (at home and at school). Through positive engagement with compulsory (secondary) education, children with ACEs may gain not only qualifications but also important life and relationship skills that help to build self-confidence, resilience and motivations for future success, all of which may support subsequent attainment in college or higher education.

Consistent with the findings elsewhere,<sup>44</sup> achieving each additional level of qualification had a predictable positive relationship with employment prospects. As ACEs were strongly associated with having no qualifications, they are likely to have an indirect effect on employment through educational achievement. The adjusted proportion of people with  $\geq 4$  ACEs and no qualifications (16%) was double that of those with 0 ACEs and no qualifications (8%), and unemployment was almost fourteen times more likely among those without any qualifications compared with those with higher qualifications. Crucially though, findings also suggest an additional independent effect of a high number of ACEs on employment, over and above their relationship through education. Thus, adults with a history of high ACEs are considerably less likely to report being in full-time employment, part-time employment or self-employment and are at much greater risk of experiencing barriers to work, including those associated with chronic health problems and disability, irrespective of qualifications obtained. Almost two of every five adults with  $\geq 4$  ACEs and secondary qualifications were unemployed at the time of the survey compared with 16% of those with secondary qualifications but no ACEs. In fact, the rate of unemployment increased to 62% among those with  $\geq 4$  ACEs and no qualifications. Ill health is commonly suggested as a mechanism linking ACEs and employment outcomes.<sup>9,23</sup> In this study, a stronger relationship between ACEs and LTSD (than unemployment) offers support to the importance of this mechanism. Elsewhere ACEs have been associated with increased rates of physical disability,<sup>45</sup> disability because of mental disorders<sup>46</sup> and disability retirement.<sup>47</sup> Other suggested mechanisms that may affect unemployment or LTSD include the impact of ACEs on interpersonal relationship problems and emotional distress,<sup>48</sup> as well as deviant behaviours such as substance abuse.<sup>20,49</sup>

Although unemployment has been decreasing in the UK since its peak in 2010, latest figures suggest that as many as 1.4 million children (0–15 years) may still live in entirely workless households.<sup>50</sup> When experienced together across the life course, ACEs, deprivation, lack of education and unemployment are all interconnected challenges that can severely limit access to life opportunities and an individual's ability to participate fully as a societal member.<sup>9</sup> Intergenerational cycles of low levels of education and employment can persist with ACEs being part of what impedes educational development in children, locks them into poverty and also contributes to them exposing their own children to ACEs in the next generation through poor parenting,<sup>51</sup> parental stress<sup>52</sup> and child maltreatment.<sup>53</sup>

There is an urgent need to develop systems for supporting those with a history of ACEs in achieving and maintaining meaningful employment. Evidence increasingly supports the use of intervention for ACEs not just in childhood but across

the life course and into adulthood.<sup>54,55</sup> ACEs have been associated with lower self-efficacy<sup>45</sup>—an important predictor of many work-based constructs, such as engagement,<sup>56</sup> performance,<sup>57</sup> job satisfaction<sup>58</sup> and returning to work after long-term absence.<sup>59</sup> Interventions such as group-based psychosocial education and goal setting have demonstrated effectiveness for improving self-efficacy in relation to a range of health and well-being outcomes (e.g. substance use;<sup>60</sup> physical activity;<sup>61</sup> and breast feeding<sup>62</sup>). Online, community and work-based self-efficacy approaches also show promise<sup>63</sup> and can improve relevant employment-related outcomes such as job search effectiveness.<sup>64</sup> However, such interventions rely on the routine identification of individuals both at risk of ACEs or already suffering their consequences. Typically, ACE surveillance systems are poorly developed, despite evidence that routine data can be used for these purposes.<sup>65</sup> Such systems should be developed in parallel with further health research to identify both better ACE prevention mechanisms and effective support and treatment for those whose childhood experiences continue to adversely impact their health, well-being and employment prospects.

Present findings must be considered in light of the following limitations. First, studies are retrospective, presenting considerable challenges for the temporal sequencing of variables. ACEs, by definition, may occur at any point during the first 18 years of life and may consequently precede or supersede secondary and college-level education. Furthermore, education may also precede or supersede employment as individuals may return to any level of education at any point in their lives. Thus, causality in the relationship between ACEs and outcomes (qualifications and employment) cannot be inferred. Second, the CDC short-form ACE tool considers a relatively narrow range of conventional ACEs and does not include constructs that may be particularly relevant to educational attainment, such as peer victimisation (bullying). However, while there are ongoing calls for the inclusion of a broader range of adversities in such tools,<sup>66,67</sup> evidence continues to support the primacy of family relationships on life course trajectories and health outcomes.<sup>68</sup> Third, included education and employment measures do not distinguish between finer gradations of achievement. For instance, it is not possible to identify if individuals with no qualifications failed to complete secondary level education (e.g. were school dropouts or excluded from the school) or completed schooling but did not achieve the required pass levels to obtain formal qualifications. Current employment reflects the status at the time of the survey and is neither a measure of broader economic (in)activity throughout adulthood nor important aspects of job performance or upward mobility. Further empirical work should explore the relationship between ACEs and different levels of success within education and employment outcomes. Finally, interpretation of findings is limited by a response rate of 59.3% which, although consistent with ACE studies reported elsewhere, may introduce a source of non-response bias and limit generalisability.

## Conclusion

An increasing literature describes how ACEs can impact child brain development, affecting both the size and activity

of structures involved in the regulation of emotions, stress and other information processing.<sup>3,7</sup> Equally studies across a range of countries identify strong positive relationships between ACEs and both the development of health-harming behaviours particularly in adolescence and the increased risks of physical and mental ill health across the life course.<sup>4</sup> This article adds to such studies by examining the relationship between ACEs and education and employment in a large study across England and Wales. While demonstrating the potentially long-lasting impact of ACEs on socio-economic outcomes, this novel analysis also highlights the potential role of education in diverting individuals from a pathway of deviant behaviour in response to trauma, to one of resilience and achievable, meaningful prospects. Findings challenge some of the common narratives around educational failure and unemployment based on motivation and shift the focus from solely on parents to the role of educators in building resilient children. High rates of people are exposed to childhood adversity. However, the education sector has considerable reach as a universal provision in many countries and a sustainable development goal in others. Therefore, policies should focus on not only ensuring the accessibility of secondary education and supporting academic attainment but also building skills and social and emotional development for those who have experienced ACEs. While findings suggest that this may go some way towards levelling the playing field for future achievements by countering childhood adversity as a source of educational inequality, efforts are still needed to support longer term employment prospects by fostering self-efficacy and resilience among working-age adults with ACEs.

## Author statements

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## Ethical approval

Ethical approval for the ACE surveys was obtained from Liverpool John Moores University Research Ethics Committee.

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## Competing interests

None declared.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.puhe.2018.09.014>.